WE CLAIM:

1. A radiation therapy system comprising:

a radiation source that moves about a path and directs a beam of radiation towards an object;

a cone-beam computer tomography system comprising:

an x-ray source that emits an x-ray beam in a cone-beam form towards said object;

an amorphous silicon flat-panel imager receiving x-rays after they pass through the object, said imager providing an image of said object; and

a computer connected to said radiation source and said cone beam computerized tomography system, wherein said computer receives said image of said object and based on said image sends a signal to said radiation source that controls said path of said radiation source.

2. The radiation therapy system of claim 1, wherein said x-ray source comprises a kV x-ray source.

3. The radiation therapy system of claim 1, wherein said kV x-ray source emits x-rays with energies of approximately 100kV.

4. The radiation therapy system of claim 1, wherein said x-ray source comprises a linear accelerator.

5. The radiation therapy system of claim 1, a stage that moves said object relative to said x-ray source and said amorphous silicon flat-panel imager.

6. The radiation therapy system of claim 5, wherein said stage rotates about an axis of rotation said object relative to said x-ray source and said amorphous silicon flat-panel imager.

7. The radiation therapy system of claim 2, a stage that moves said object relative to said x-ray source and said amorphous silicon flat-panel imager.

8. The radiation therapy system of claim 7, wherein said stage rotates about an axis of rotation said object relative to said x-ray source and said amorphous silicon flat-panel imager.

9. The radiation therapy system of claim 4, a stage that moves said object relative to said x-ray source and said amorphous silicon flat-panel imager.

10. The radiation therapy system of claim 9, wherein said stage rotates about an axis of rotation said object relative to said x-ray source and said amorphous silicon flat-panel imager.

11. The radiation therapy system of claim 1, wherein said x-rays from said x-ray source are emitted along a source plane.

12. The radiation therapy system of claim 6, wherein said x-rays from said x-ray source are emitted along a source plane that is perpendicular to said axis of rotation.

13. The radiation therapy system of claim 10, further comprising an alignment laser that allows visualization of said axis of rotation and said source plane.

14. The radiation therapy system of claim 1, wherein said amorphous silicon flat-panel imager comprises an array of individual detector elements.

15. The radiation therapy system of claim 14, wherein said array is a two-dimensional array.

16. The radiation therapy system of claim 14, wherein each of said individual detector elements comprises a-Si:H photodiode.

17. The radiation therapy system of claim 16, wherein each of said individual detector elements further comprises a transistor coupled to said Si:H photodiode.

18. The radiation therapy system of claim 1, wherein said computer receives said image from said amorphous silicon flat-panel imager and generates a computer tomography image of said object based on said received image.

19. The radiation therapy system of claim 1, wherein said image is a two dimensional projection image.

20. The radiation therapy system of claim 19, wherein said computer receives said two dimensional projection image from said amorphous silicon flat-panel imager and generates a computer tomography image of said object based on said two dimensional projection image.

21. The radiation therapy system of claim 1, further comprising a gantry with a first arm and a second arm, wherein said x-ray source is attached to said first arm and said amorphous silicon flat-panel imager is attached to said second arm.

22. The radiation therapy system of claim 21, wherein said gantry rotates about an axis of rotation.

23. The radiation therapy system of claim 22, wherein said gantry rotates about a second axis of rotation.

24. The radiation therapy system of claim 21, wherein said gantry is attached to a wall of a room.

25. The radiation therapy system of claim 23, wherein said gantry is attached to a wall of a room.

26. The radiation therapy system of claim 22, wherein said gantry is attached to a mobile platform that can translationally move on a floor of a room.

27. The radiation therapy system of claim 23, wherein said gantry is attached to a mobile platform that can translationally move on a floor of a room.

28. The radiation therapy system of claim 1, wherein said radiation source operates at a power level higher than that of said x-ray source, wherein said radiation is of an intensity and energy that is effective for radiation treatment of an area of said object.

29. The radiation therapy system of claim 21, wherein said radiation source operates at a power level higher than that of said x-ray source, wherein said radiation is of an intensity and energy that is effective for radiation treatment of an area of said object.

30. The radiation therapy system of claim 1, wherein said x-ray source is coincident with said radiation source.

31. The radiation therapy system of claim 1, wherein said x-ray source is displaced relative to said radiation source.

32. The radiation therapy system of claim 1, wherein operation of said cone beam computerized tomography system with an external trigger that controls a biological process of a patient in which said object is located.

33. The radiation therapy system of claim 32, wherein said external trigger comprises an active breathing control mechanism.

34. The radiation therapy system of claim 32, wherein said external trigger comprises a cardiac gating mechanism.

35. The radiation therapy system of claim 1, further comprising an imaging device positioned opposite said radiation source and generating an

image of said object based on radiation from said radiation source that passes through said object.

36. An imaging system comprising:

an x-ray source that emits x-rays towards an object;

an imager that receives x-rays from said object based on said emitted x-rays and forms an image of said object;

an imager support system that attaches said imager to a support structure, wherein said imager support system comprises:

a first arm having one end attached to said imager and another end attached to said support structure; and

a second arm having one end attached to said imager and another end attached to said support structure.

37. The imaging system of claim 36, wherein said imager support system comprises a third arm having one end attached to said imager and another end attached to said support structure.

38. The imaging system of claim 37, wherein said third arm lies in a plane that bisects a line segment that joins said one ends of said first and second arms.

39. The imaging system of claim 38, wherein said imager is symmetrically positioned with respect to said plane.

40. The imaging system of claim 38, wherein said imager is asymmetrically positioned with respect to said plane.

41. The imaging system of claim 38, further comprising a motorized system that moves said imager from a position where said imager is symmetrically positioned with respect to said plane to a position where said imager is asymmetrically positioned with respect to said plane.

42. The imaging system of claim 37, wherein each of said another ends of said first, second and third arms are attached to a pivot which is attached to said support structure.

43. The imaging system of claim 36, wherein said support structure comprises a rotating drum of a gantry.

44. The imaging system of claim 43, wherein said x-ray source is attached to said rotating drum.

45. The imaging system of claim 44, wherein said x-ray source translates in a direction that is parallel to an axis of rotation of said drum.

46. The imaging system of claim 43, further comprising a radiation source attached to said rotating drum.

47. The imaging system of claim 36, wherein said x-rays emitted from said x-ray source are emitted in a cone beam form.

48. The imaging system of claim 36, wherein said imager comprises an amorphous silicon flat-panel imager.

49. An imaging system comprising:

an x-ray source that emits x-rays towards an object;

an imager that receives x-rays from said object based on said emitted x-rays and forms an image of said object;

an imager support system that attaches said imager to a support structure, wherein said imager support system comprises:

a pivoting arm that has one end pivotably attached to said support structure and another end pivotably attached to said imager.

50. The imaging system of claim 49, wherein said support structure comprises a rotating drum of a gantry.

51. The imaging system of claim 50, wherein said x-ray source is attached to said rotating drum.

52. The imaging system of claim 51, wherein said x-ray source translates in a direction that is parallel to an axis of rotation of said drum.

53. The imaging system of claim 50, further comprising a radiation source attached to said rotating drum.

54. The imaging system of claim 49, wherein said x-rays emitted from said x-ray source are emitted in a cone beam form.

55. The imaging system of claim 49, wherein said imager comprises an amorphous silicon flat-panel imager.

56. An imaging system comprising:

an x-ray source that emits x-rays towards an object;

an imager that receives x-rays from said object based on said emitted x-rays and forms an image of said object;

an imager support system that attaches said imager to a support structure, wherein said imager support system comprises:

a C-arm attached to a support structure, wherein said imager is attached to one end of said C-arm.

57. The imaging system of claim 56, wherein said C-arm moves along an arc.

58. The imaging system of claim 56, wherein said support structure comprises a rotating drum of a gantry.

59. The imaging system of claim 58, wherein said x-ray source is attached to another end of said C-arm.

60. The imaging system of claim 58, further comprising a radiation source attached to said rotating drum.

61. The imaging system of claim 56, wherein said x-rays emitted from said x-ray source are emitted in a cone beam form.

62. The imaging system of claim 56, wherein said imager comprises an amorphous silicon flat-panel imager.

63. A method of treating an object with radiation, comprising:

move a radiation source about a path;

direct a beam of radiation from said radiation source towards an object;

emitting an x-ray beam in a cone beam form towards an object;

detecting x-rays that pass through said object due to said emitting an x-ray beam with an amorphous silicon flat-panel imager;

generating an image of said object from said detected x-rays; and

controlling said path of said radiation source based on said image.

64. The method of claim 63, wherein x-rays within said x-ray beam have an energy of approximately 100kV.

65. The method of claim 63, comprising rotating about an axis of rotation said object relative to said x-ray source and said amorphous silicon flat-panel imager.

66. The method of claim 63, wherein said amorphous silicon flat-panel imager comprises an array of individual detector elements.

67. The method of claim 66, wherein said array is a two-dimensional array.

68. The method of claim 66, wherein each of said individual detector elements comprises a-Si:H photodiode.

69. The method of claim 66, wherein said generating comprises forming a computer tomography image of said object based on said detected x-rays.

70. The method of claim 65, further comprising rotating about a second axis of rotation said object relative to said x-ray source and said amorphous silicon flat-panel imager.

71. The method of claim 63, further comprising emitting a second set of x-rays, separate from said x-rays emitted from said x-ray source, that have an intensity and energy that is effective for radiation treatment of an area of said body.

72. The method of claim 71, wherein said second set of x-rays has an intensity and energy greater than said x-rays emitted from said x-ray source.

73. The method of claim 69, further comprising correcting for offset and gain prior to said generating.

74. The method of claim 63, wherein said object comprises an animal.

75. The method of claim 63, wherein said image delineates soft tissue within said animal.

76. The method of claim 75, wherein said soft tissue is selected from the group consisting of fat, a muscle, a kidney, a stomach, a bowel and a liver.

77. The method of claim 65, wherein said image is formed after one rotation of said body relative to said x-ray source and said amorphous silicon flat-panel imager.

78. The method of claim 63, wherein said x-ray beam is generated by an x-ray source that moves independently of said amorphous silicon flat-

panel imager, said x-ray source moves on a sinusoidal or sawtooth path constrained to a surface of a cylinder while said amorphous silicon panel imager moves in a circular path on a surface of a cylinder.

79. The method of claim 78, further comprising adjusting a collimator in real time to adjust a shape of said x-ray beam so it is confined to an active area of said amorphous silicon flat panel imager.

80. The method of claim 63, wherein said x-ray beam is generated by an x-ray source that moves dependently of said amorphous silicon flat-panel imager, said x-ray source and said amorphous silicon flat-panel imager each moves on a sinusoidal trajectory on a spherical surface.

81. A method of adding an auxiliary imaging system to an existing radiation therapy system, said method comprising:

providing an existing radiation therapy system that comprises a radiation source that is supported on a support structure; and

attaching an imager that does not directly face said radiation source to said support structure.

82. The method of claim 81, wherein said attaching comprises:

attaching said imager to an imager support system;

forming an opening in said support structure;

inserting a male member through an opening formed in said imager support system and said opening formed in said support structure; and

attaching said inserted male member to said support structure and said imager support system.

83. The method of claim 82, wherein said attaching said inserted male member comprises tightening a nut onto said male member.

84. The method of claim 81, wherein said support structure comprises a rotating drum.

85. The method of claim 82, wherein said support structure comprises a rotating drum.

86. The method of claim 81, further comprising attaching an x-ray source to said support structure.

87. The method of claim 84, further comprising attaching an x-ray source to said rotating drum.

88. The method of claim 85, further comprising attaching an x-ray source to said rotating drum.

89. A method of delineating a target volume located within a body and shown in a computerized tomography image, comprising:

forming a computerized tomography image of a target volume in a body; and

manually localizing said target volume in a slice of said computerized tomography image.

90. The method of claim 89, wherein said manually localizing comprises contouring of structures in said slice.

91. The method of claim 89, wherein said manually localizing comprises contouring of structures of said slice in combination with one or more different slices of said computerized tomography image.

92. A method of delineating a target volume located within a body and shown in a computerized tomography image, comprising:

forming a computerized tomography image of a target volume in a body;

detecting said target volume

identifying translations and/or rotations of said target volume relative to a position and orientation in a planning image;

adjusting the location and/or orientation of said target volume;

selecting a radiation therapy treatment plan from a previously formed set of radiation therapy treatment plans as a function of said detected location and/or orientation of said target volume.

93. A method of delineating a target volume located within a body and shown in a computerized tomography image, comprising:

forming a computerized tomography image of a target volume in a body;

identifying translations and/or rotations of said target volume relative to a position and orientation in a planning image;

adjusting the location and/or orientation of said target volume;

calculating a radiation therapy treatment plan based on said adjusted location and/or orientation of said target volume.